

[0061]

**CLAIMS**

We claim:

1. 1. In a method of patterning a layer of photoresist which has been applied over a photomask substrate and exposed to imaging radiation, the improvement comprising exposing said imaged photoresist to a vacuum for a period of time sufficient to allow pattern critical dimensions to equilibrate across said photoresist, at a process chamber pressure ranging from about  $5 \times 10^{-6}$  mTorr to about 5 mTorr.
1. 2. A method in accordance with Claim 1, wherein exposure of said imaged photoresist to said vacuum is performed at a substrate temperature within the range of about 18°C to about 60°C, for a period of time within the range of about 10 minutes to about 70 hours.
1. 3. A method in accordance with Claim 2, wherein exposure of said imaged photoresist to said vacuum is performed at a substrate temperature within the range of about 18°C to about 40°C, for a period of time within the range of about 20 minutes to about 12 hours.
1. 4. A method in accordance with Claim 1, wherein said radiation is e-beam radiation.
1. 5. A method in accordance with Claim 1, wherein said radiation is optical radiation.
1. 6. A method in accordance with Claim 1, wherein exposure of said imaged photoresist to said vacuum is performed prior to the performance of a post-exposure bake process.

1        7.        A method in accordance with Claim 1, wherein said exposure of said imaged  
2        photoresist to said vacuum is performed prior to development of said photoresist to create  
3        a pattern having openings through said photoresist layer thickness.

1        8.        In a method of patterning a layer of photoresist which has been applied over a  
2        photomask substrate, exposed to imaging radiation, and developed to create a pattern having  
3        openings through said photoresist layer thickness, the improvement comprising exposing  
4        said developed photoresist to a vacuum at a substrate temperature within the range of about  
5        20°C to about 60°C for a period of time within the range of about 10 minutes to about  
6        60 minutes, at a process chamber pressure ranging from about  $5 \times 10^{-6}$  mTorr to about 5  
7        mTorr.

1        9.        A method of patterning a layer of photoresist which has been applied over a  
2        photomask substrate, comprising:

3              a)        post-apply baking said photoresist;  
4              b)        exposing said photoresist to imaging radiation;  
5              c)        exposing said imaged photoresist to a vacuum for a period of time  
6        sufficient to allow pattern critical dimensions to equilibrate across said photoresist, at a  
7        process chamber pressure ranging from about  $5 \times 10^{-6}$  mTorr to about 5 mTorr;  
8              d)        post-exposure baking said imaged photoresist; and  
9              e)        developing said imaged photoresist to create a pattern having openings  
10        through said photoresist layer thickness.

1        10.        A method in accordance with Claim 9, wherein exposure of said imaged  
2        photoresist to said vacuum is performed at a substrate temperature within the range of about  
3        18°C to about 60°C, for a period of time within the range of about 10 minutes to about  
4        70 hours.

1        11.      A method in accordance with Claim 10, wherein exposure of said imaged  
2      photoresist to said vacuum is performed at a substrate temperature within the range of about  
3      18°C to about 40°C, for a period of time within the range of about 20 minutes to about  
4      12 hours.

1        12.      A method in accordance with Claim 9, wherein said radiation is e-beam radiation.

1        13.      A method in accordance with Claim 9, wherein said radiation is optical radiation.

1        14.      A method in accordance with Claim 9, wherein said method further includes the  
2      following step:

3                f)      exposing said developed photoresist to a vacuum at a substrate  
4      temperature within the range of about 20°C to about 60°C for a period of time within the  
5      range of about 10 minutes to about 60 minutes, at a process chamber pressure ranging from  
6      about  $5 \times 10^{-6}$  mTorr to about 5 mTorr.

1        15.      A method of patterning a layer of photoresist which has been applied over a  
2      photomask substrate, comprising:

3                a)      post-apply baking said photoresist;  
4                b)      exposing said photoresist to imaging radiation;  
5                c)      post-exposure baking said imaged photoresist;  
6                d)      developing said imaged photoresist to create a pattern having openings  
7      through said photoresist layer thickness; and

8                e)      exposing said developed photoresist to a vacuum at a substrate  
9      temperature within the range of about 20°C to about 60°C for a period of time within the  
10     range of about 10 minutes to about 60 minutes, at a process chamber pressure ranging from  
11     about  $5 \times 10^{-6}$  mTorr to about 5 mTorr.

1        16.        A method in accordance with Claim 15, wherein said imaging radiation is e-beam  
2                      radiation.

1        17.        A method in accordance with Claim 15, wherein said imaging radiation is optical  
2                      radiation.